Austin Animal Center: An Analysis

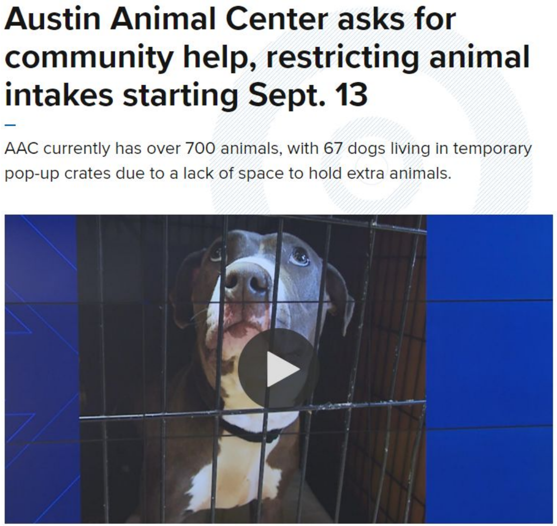
By Project A-Team

Our objective was to analyze the intakes and outcomes of animals in the shelter to observe trends by zip code and predict adoptability by characteristics.

AUSTIN
ANIMAL
CENTER

Adopt

If analysis shows that certain traits make an animal more adoptable, the AAC can focus its efforts on those animals to improve availability. Conversely, if the AAC can focus education efforts in areas that have high intake volumes.



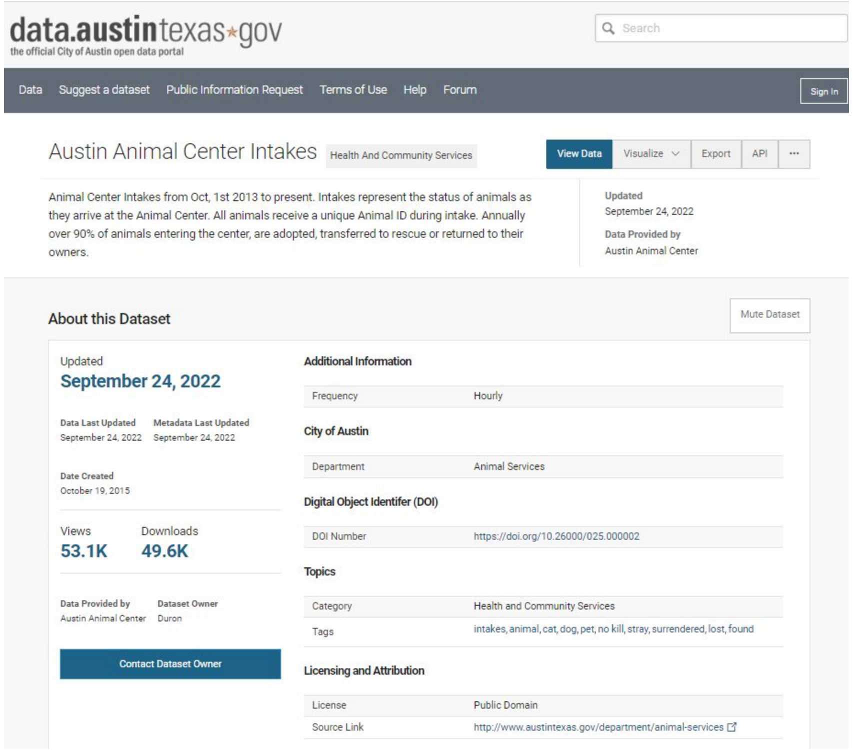
Austin Animal Center asks for community help, restricting animal intakes starting Sept. 13

AAC currently has over 700 animals, with 67 dogs living in temporary pop-up crates due to a lack of space to hold extra animals.

The Players

Role	Responsibility	Name
Square ■	Github	Corinne Bean
Circle ●	Machine Learning	
Triangle ▲	Database	Sharon Dieckert
Exes ✖	Project Management	Nick Foley & Ashley Rock

Data Sources



Austin Animal Center Intakes

Health And Community Services

Animal Center Intakes from Oct, 1st 2013 to present. Intakes represent the status of animals as they arrive at the Animal Center. All animals receive a unique Animal ID during intake. Annually over 90% of animals entering the center, are adopted, transferred to rescue or returned to their owners.

Updated
September 24, 2022

Data Provided by
Austin Animal Center

About this Dataset

Updated
September 24, 2022

Data Last Updated September 24, 2022

Metadata Last Updated September 24, 2022

Date Created October 19, 2015

Views **53.1K**

Downloads **49.6K**

Data Provided by Austin Animal Center

Dataset Owner Duron

Additional Information

Frequency	Hourly

City of Austin

Department	Animal Services

Digital Object Identifer (DOI)

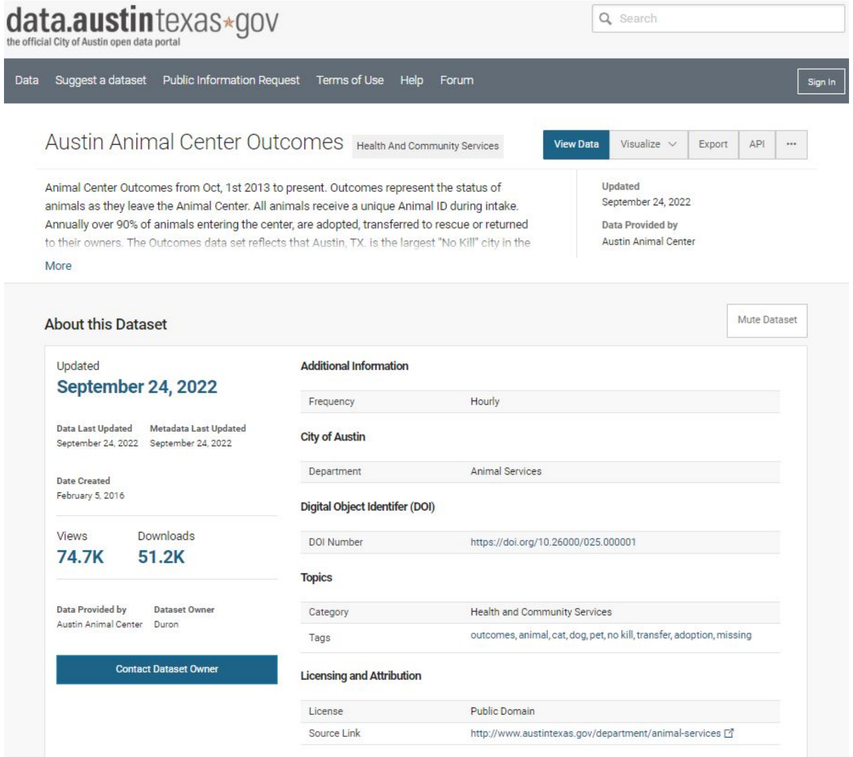
DOI Number	https://doi.org/10.26000/025.000002

Topics

Category	Health and Community Services
Tags	intakes, animal, cat, dog, pet, no kill, stray, surrendered, lost, found

Licensing and Attribution

License	Public Domain
Source Link	http://www.austintexas.gov/department/animal-services



Austin Animal Center Outcomes

Health And Community Services

Animal Center Outcomes from Oct, 1st 2013 to present. Outcomes represent the status of animals as they leave the Animal Center. All animals receive a unique Animal ID during intake. Annually over 90% of animals entering the center, are adopted, transferred to rescue or returned to their owners. The Outcomes data set reflects that Austin, TX. is the largest "No Kill" city in the

More

Updated
September 24, 2022

Data Provided by
Austin Animal Center

About this Dataset

Updated
September 24, 2022

Data Last Updated September 24, 2022

Metadata Last Updated September 24, 2022

Date Created February 5, 2016

Views **74.7K**

Downloads **51.2K**

Data Provided by Austin Animal Center

Dataset Owner Duron

Additional Information

Frequency	Hourly

City of Austin

Department	Animal Services

Digital Object Identifer (DOI)

DOI Number	https://doi.org/10.26000/025.000001

Topics

Category	Health and Community Services
Tags	outcomes, animal, cat, dog, pet, no kill, transfer, adoption, missing

Licensing and Attribution

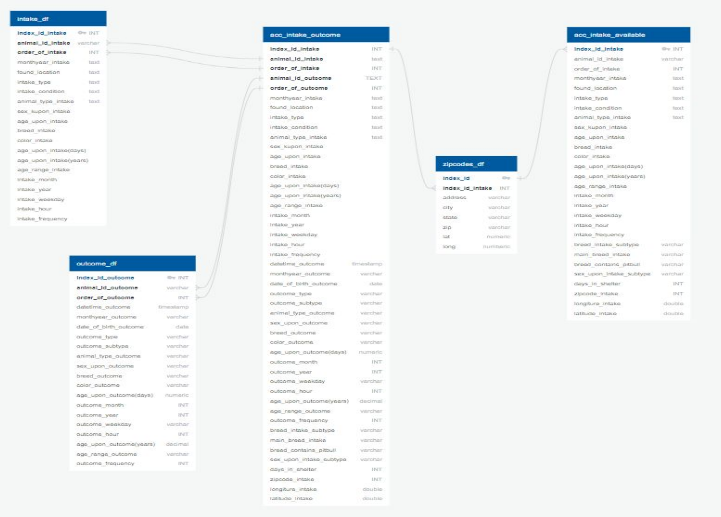
License	Public Domain
Source Link	http://www.austintexas.gov/department/animal-services

Github

Corinne, this is where you do your thing! Maybe a screenshot of GH? Include some speaker notes.

Database

Sharon, quick overview of the DB? I’ve put the DB slides below this, but think it should be consolidated and add speaker notes



intake_df	
index_id_intake	INT
animal_id_intake	varchar
order_of_intake	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	

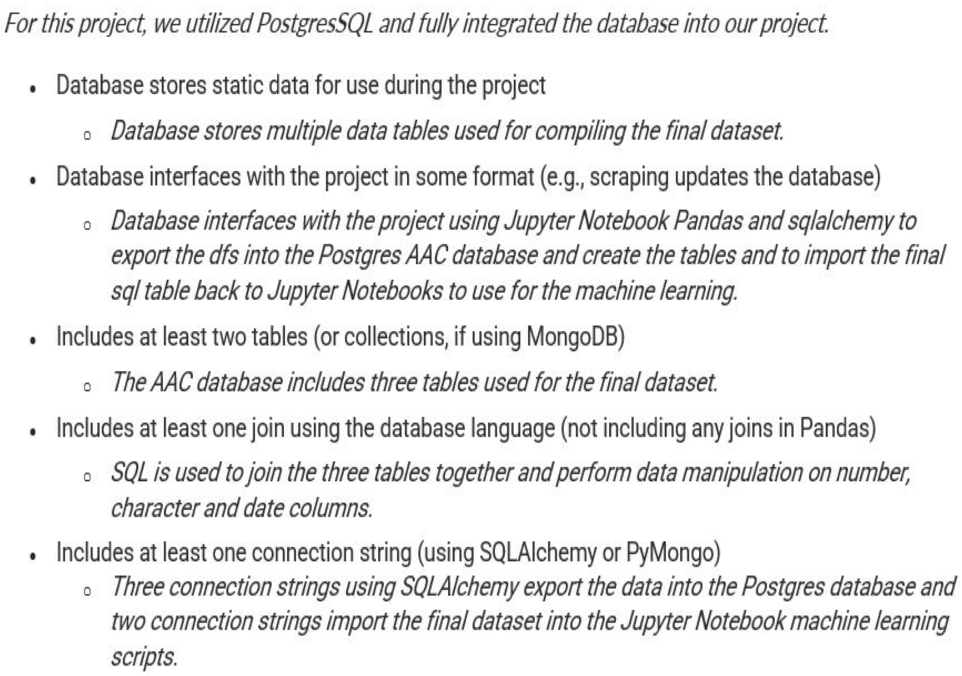
outcome_df	
index_id_outcome	INT
animal_id_outcome	varchar
order_of_outcome	INT
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT

acc_intake_outcome	
index_id_intake	INT
animal_id_intake	text
order_of_intake	INT
animal_id_outcome	TEXT
order_of_outcome	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT
breed_intake_subtype	varchar
main_breed_intake	varchar
breed_contains_pitbull	varchar
sex_upon_intake_subtype	varchar
days_in_shelter	INT
zipcode_intake	INT
longiture_intake	double
latitude_intake	double

zipcodes_df	
index_id	
index_id_intake	INT
address	varchar
city	varchar
state	varchar
zip	varchar
lat	numeric
long	numberic

acc_intake_available	
index_id_intake	INT
animal_id_intake	varchar
order_of_intake	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	
breed_intake_subtype	varchar
main_breed_intake	varchar
breed_contains_pitbull	varchar
sex_upon_intake_subtype	varchar
days_in_shelter	INT
zipcode_intake	INT
longiture_intake	double
latitude_intake	double

Database Integration

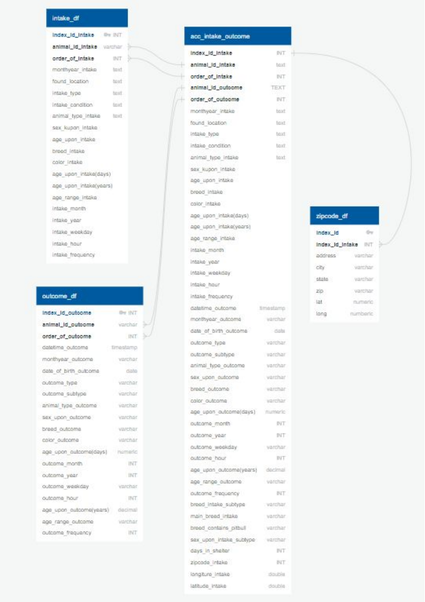


For this project, we utilized PostgresSQL and fully integrated the database into our project.

- Database stores static data for use during the project
    - *Database stores multiple data tables used for compiling the final dataset.*
- Database interfaces with the project in some format (e.g., scraping updates the database)
    - *Database interfaces with the project using Jupyter Notebook Pandas and sqlalchemy to export the dfs into the Postgres AAC database and create the tables and to import the final sql table back to Jupyter Notebooks to use for the machine learning.*
- Includes at least two tables (or collections, if using MongoDB)
    - *The AAC database includes three tables used for the final dataset.*
- Includes at least one join using the database language (not including any joins in Pandas)
    - *SQL is used to join the three tables together and perform data manipulation on number, character and date columns.*
- Includes at least one connection string (using SQLAlchemy or PyMongo)
    - *Three connection strings using SQLAlchemy export the data into the Postgres database and two connection strings import the final dataset into the Jupyter Notebook machine learning scripts.*

Workflow of Project: Database

Database ERD



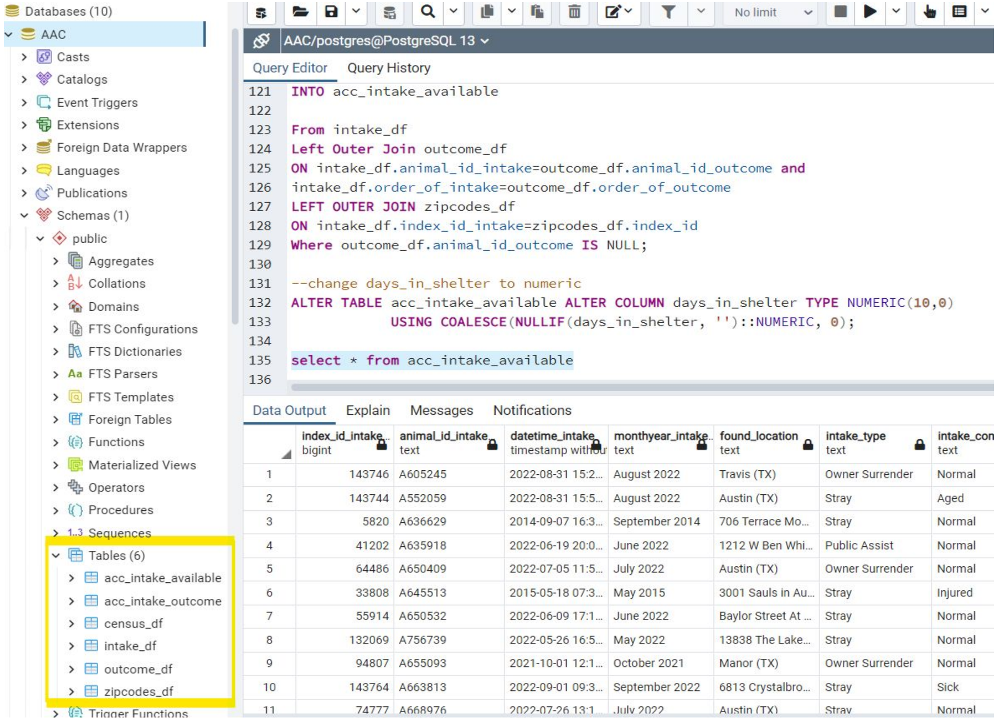
intake_df	
index_id_intake	🔑 INT
animal_id_intake	varchar
order_of_intake	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	

outcome_df	
index_id_outcome	🔑 INT
animal_id_outcome	varchar
order_of_outcome	INT
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT

acc_intake_outcome	
index_id_intake	INT
animal_id_intake	text
order_of_intake	INT
animal_id_outcome	TEXT
order_of_outcome	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT
breed_intake_subtype	varchar
main_breed_intake	varchar
breed_contains_pitbull	varchar
sex_upon_intake_subtype	varchar
days_in_shelter	INT
zipcode_intake	INT
longiture_intake	double
latitude_intake	double

zipcode_df	
index_id	🔑
index_id_intake	INT
address	varchar
city	varchar
state	varchar
zip	varchar
lat	numeric
long	numberic

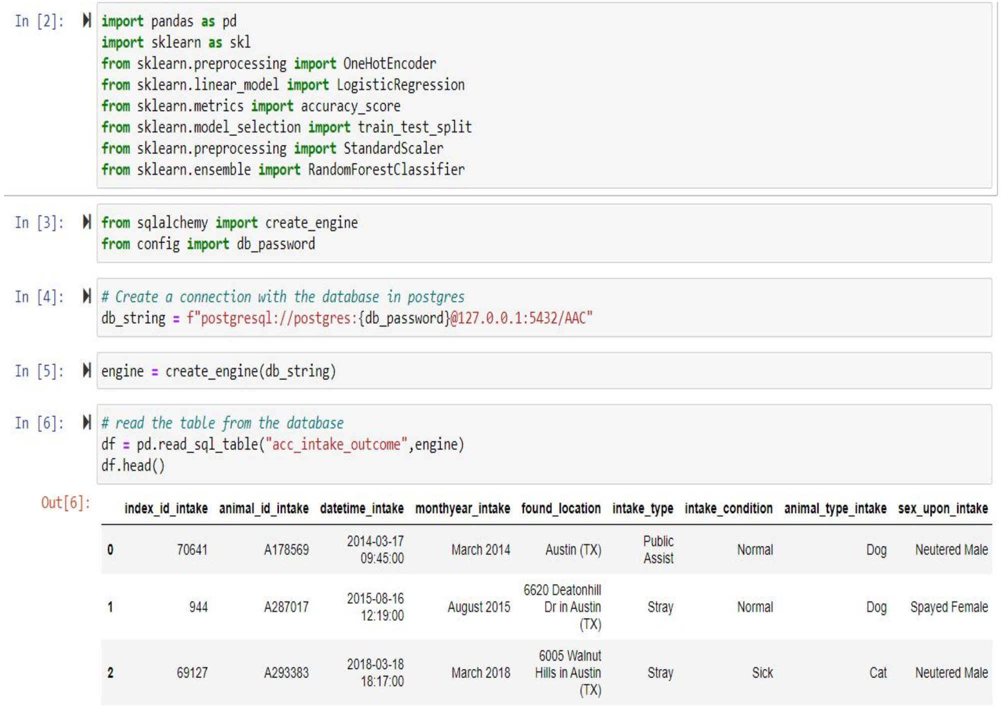
Postgres Database Stores Data Tables



```sql
INTO acc_intake_available

From intake_df
Left Outer Join outcome_df
ON intake_df.animal_id_intake=outcome_df.animal_id_outcome and
intake_df.order_of_intake=outcome_df.order_of_outcome
LEFT OUTER JOIN zipcodes_df
ON intake_df.index_id_intake=zipcodes_df.index_id
Where outcome_df.animal_id_outcome IS NULL;

--change days_in_shelter to numeric
ALTER TABLE acc_intake_available ALTER COLUMN days_in_shelter TYPE NUMERIC(10,0)
            USING COALESCE(NULLIF(days_in_shelter, '')::NUMERIC, 0);

select * from acc_intake_available

```

	index_id_intake... bigint	animal_id_intake text	datetime_intake timestamp without	monthyear_intake... text	found_location text	intake_type text	intake_con text
1	143746	A605245	2022-08-31 15:2...	August 2022	Travis (TX)	Owner Surrender	Normal
2	143744	A552059	2022-08-31 15:5...	August 2022	Austin (TX)	Stray	Aged
3	5820	A636629	2014-09-07 16:3...	September 2014	706 Terrace Mo...	Stray	Normal
4	41202	A635918	2022-06-19 20:0...	June 2022	1212 W Ben Whi...	Public Assist	Normal
5	64486	A650409	2022-07-05 11:5...	July 2022	Austin (TX)	Owner Surrender	Normal
6	33808	A645513	2015-05-18 07:3...	May 2015	3001 Sauls in Au...	Stray	Injured
7	55914	A650532	2022-06-09 17:1...	June 2022	Baylor Street At ...	Stray	Normal
8	132069	A756739	2022-05-26 16:5...	May 2022	13838 The Lake...	Stray	Normal
9	94807	A655093	2021-10-01 12:1...	October 2021	Manor (TX)	Owner Surrender	Normal
10	143764	A663813	2022-09-01 09:3...	September 2022	6813 Crystalbro...	Stray	Sick
11	74777	A668976	2022-07-26 13:1...	July 2022	Austin (TX)	Stray	Normal

Database Interfaces With AAC_ML_model_Adopted(Success_Failure) - Dog/Cat



In [2]:
```
import pandas as pd
import sklearn as skl
from sklearn.preprocessing import OneHotEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.ensemble import RandomForestClassifier
```

In [3]:
```
from sqlalchemy import create_engine
from config import db_password
```

In [4]:
```
# Create a connection with the database in postgres
db_string = f"postgresql://postgres:{db_password}@127.0.0.1:5432/AAC"
```

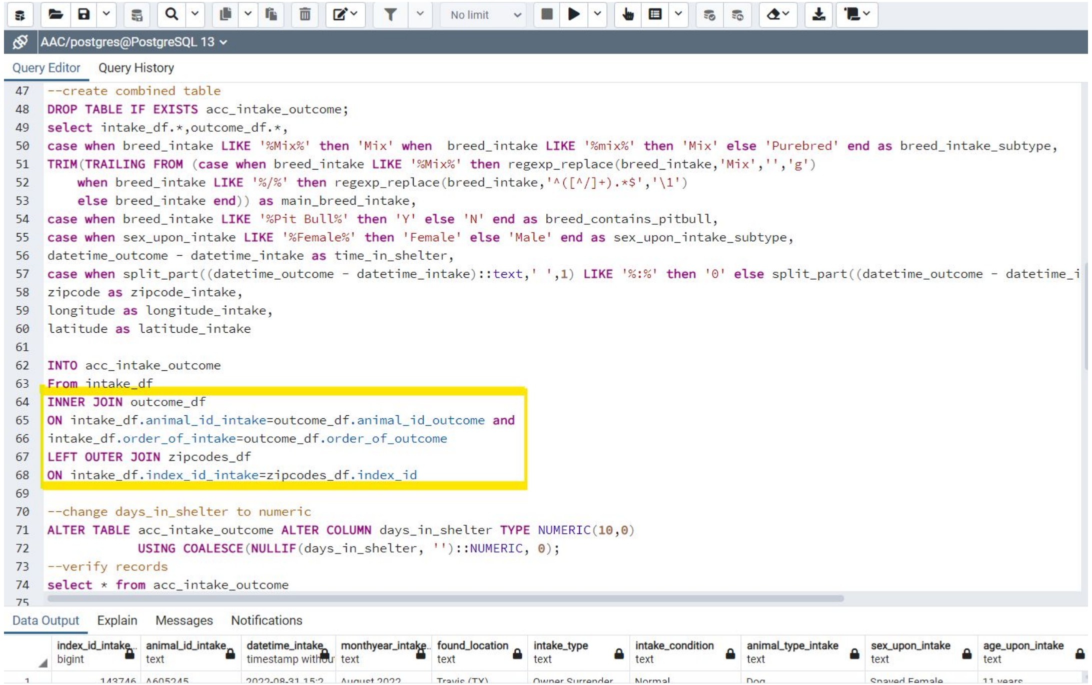
In [5]:
```
engine = create_engine(db_string)
```

In [6]:
```
# read the table from the database
df = pd.read_sql_table("acc_intake_outcome",engine)
df.head()
```

Out[6]:

	index_id_intake	animal_id_intake	datetime_intake	monthyear_intake	found_location	intake_type	intake_condition	animal_type_intake	sex_upon_intake
0	70641	A178569	2014-03-17 09:45:00	March 2014	Austin (TX)	Public Assist	Normal	Dog	Neutered Male
1	944	A287017	2015-08-16 12:19:00	August 2015	6620 Deatonhill Dr in Austin (TX)	Stray	Normal	Dog	Spayed Female
2	69127	A293383	2018-03-18 18:17:00	March 2018	6005 Walnut Hills in Austin (TX)	Stray	Sick	Cat	Neutered Male

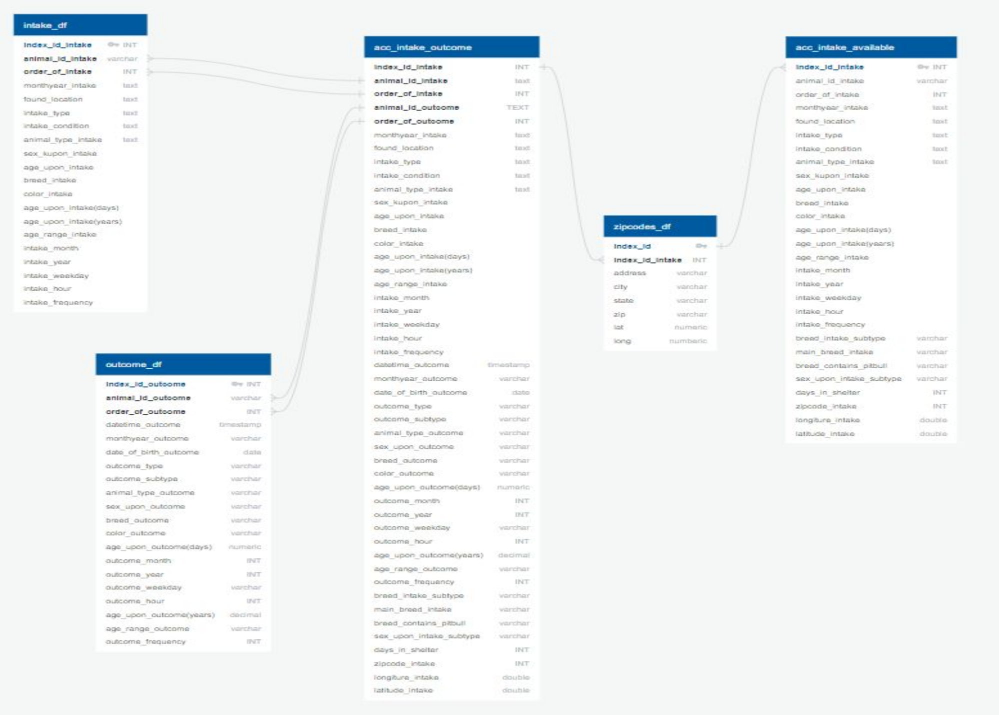
Database Includes Joins. Refer to full SQL @ /Database/aac.sql



```
--create combined table
DROP TABLE IF EXISTS acc_intake_outcome;
select intake_df.*,outcome_df.*,
case when breed_intake LIKE '%Mix%' then 'Mix' when  breed_intake LIKE '%mix%' then 'Mix' else 'Purebred' end as breed_intake_subtype,
TRIM(TRAILING FROM (case when breed_intake LIKE '%Mix%' then regexp_replace(breed_intake,'Mix','','g')
    when breed_intake LIKE '%/%' then regexp_replace(breed_intake,'^([^/]+).*$','\1')
    else breed_intake end)) as main_breed_intake,
case when breed_intake LIKE '%Pit Bull%' then 'Y' else 'N' end as breed_contains_pitbull,
case when sex_upon_intake LIKE '%Female%' then 'Female' else 'Male' end as sex_upon_intake_subtype,
datetime_outcome - datetime_intake as time_in_shelter,
case when split_part((datetime_outcome - datetime_intake)::text,' ',1) LIKE '%:%' then '0' else split_part((datetime_outcome - datetime_i
zipcode as zipcode_intake,
longitude as longitude_intake,
latitude as latitude_intake

INTO acc_intake_outcome
From intake_df
INNER JOIN outcome_df
ON intake_df.animal_id_intake=outcome_df.animal_id_outcome and
intake_df.order_of_intake=outcome_df.order_of_outcome
LEFT OUTER JOIN zipcodes_df
ON intake_df.index_id_intake=zipcodes_df.index_id

--change days_in_shelter to numeric
ALTER TABLE acc_intake_outcome ALTER COLUMN days_in_shelter TYPE NUMERIC(10,0)
            USING COALESCE(NULLIF(days_in_shelter, ''))::NUMERIC, 0);
--verify records
select * from acc_intake_outcome
```

	index_id_intake... bigint	animal_id_intake text	datetime_intake timestamp without	monthyear_intake... text	found_location text	intake_type text	intake_condition text	animal_type_intake text	sex_upon_intake text	age_upon_intake text
1	143746	A605245	2022-08-31 15:2	August 2022	Travis (TX)	Owner Surrender	Normal	Dog	Spayed Female	11 years

ERD



intake_df

index_id_intake	INT
animal_id_intake	varchar
order_of_intake	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	

outcome_df

index_id_outcome	INT
animal_id_outcome	varchar
order_of_outcome	INT
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT

acc_intake_outcome

index_id_intake	INT
animal_id_intake	text
order_of_intake	INT
animal_id_outcome	TEXT
order_of_outcome	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	
datetime_outcome	timestamp
monthyear_outcome	varchar
date_of_birth_outcome	date
outcome_type	varchar
outcome_subtype	varchar
animal_type_outcome	varchar
sex_upon_outcome	varchar
breed_outcome	varchar
color_outcome	varchar
age_upon_outcome(days)	numeric
outcome_month	INT
outcome_year	INT
outcome_weekday	varchar
outcome_hour	INT
age_upon_outcome(years)	decimal
age_range_outcome	varchar
outcome_frequency	INT
breed_intake_subtype	varchar
main_breed_intake	varchar
breed_contains_pitbull	varchar
sex_upon_intake_subtype	varchar
days_in_shelter	INT
zipcode_intake	INT
longiture_intake	double
latitude_intake	double

zipcodes_df

index_id	
index_id_intake	INT
address	varchar
city	varchar
state	varchar
zip	varchar
lat	numeric
long	numberic

acc_intake_available

index_id_intake	INT
animal_id_intake	varchar
order_of_intake	INT
monthyear_intake	text
found_location	text
intake_type	text
intake_condition	text
animal_type_intake	text
sex_kupon_intake	
age_upon_intake	
breed_intake	
color_intake	
age_upon_intake(days)	
age_upon_intake(years)	
age_range_intake	
intake_month	
intake_year	
intake_weekday	
intake_hour	
intake_frequency	
breed_intake_subtype	varchar
main_breed_intake	varchar
breed_contains_pitbull	varchar
sex_upon_intake_subtype	varchar
days_in_shelter	INT
zipcode_intake	INT
longiture_intake	double
latitude_intake	double

Machine Learning

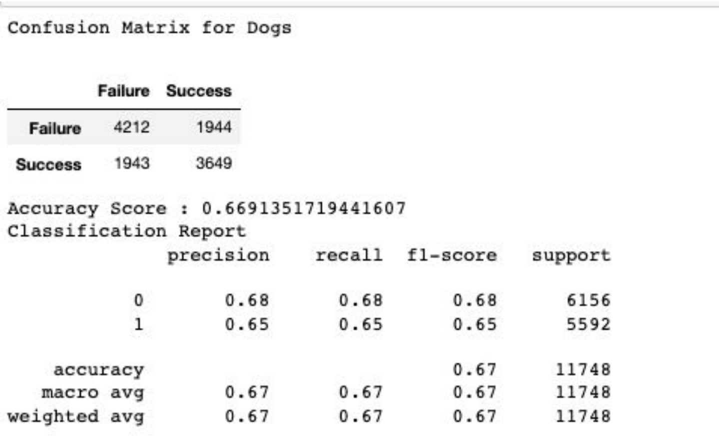
Shruti does her thing. I would suggest a simple overview “We wanted to see if we could predict the probability of an animal being adopted based on features such as breed, color, age, time in shelter, and health.

To create a binary option, we declared a “Successful” outcome as one where the animal was adopted (But we removed RTO from the success list, right? My memory is a sieve). Failed outcomes include animals that remain in the shelter, were transferred to partner shelters, were euthanized or died while in AAC custody (AND RTO?).

I created logistic regression and random forest models that took in these features and and predicted the probability that an animal would be adopted or not. The results were this for cats and this for dogs.

Some of the issues that arose were low recall rates because of the high rates of success compared with failures at the shelter. As a result I modified the models by adjusting our success and fail metrics to make the sample sizes more even (Or whatever you did!).

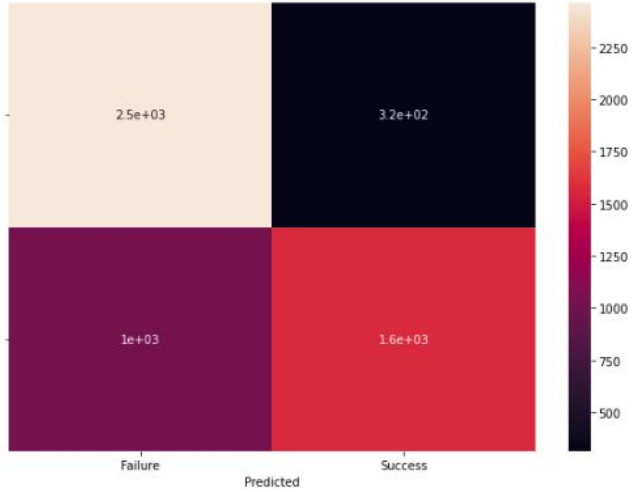
Logistic Regression Results - Dogs



Confusion Matrix for Dogs

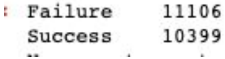
	Failure	Success
Failure	4212	1944
Success	1943	3649

```
Accuracy Score : 0.6691351719441607
Classification Report
              precision    recall  f1-score   support

           0       0.68      0.68      0.68      6156
           1       0.65      0.65      0.65      5592

    accuracy                           0.67     11748
   macro avg       0.67      0.67      0.67     11748
weighted avg       0.67      0.67      0.67     11748
```

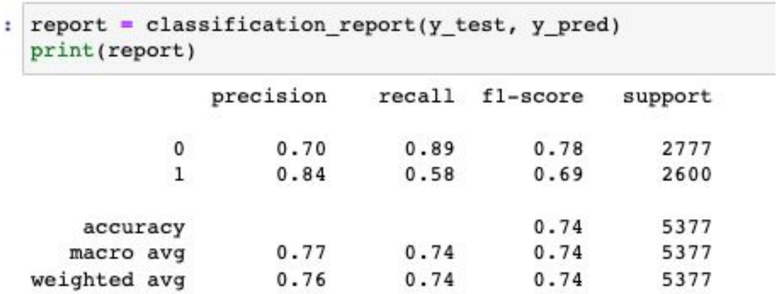


Logistic Regression Results – Cats

Confusion Matrix for Cats

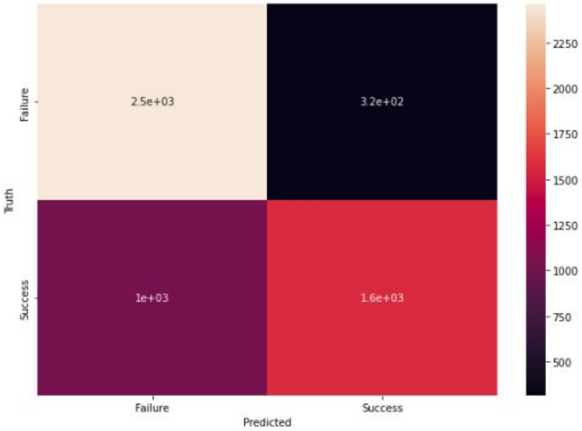


```
Failure    11106
Success    10399
```

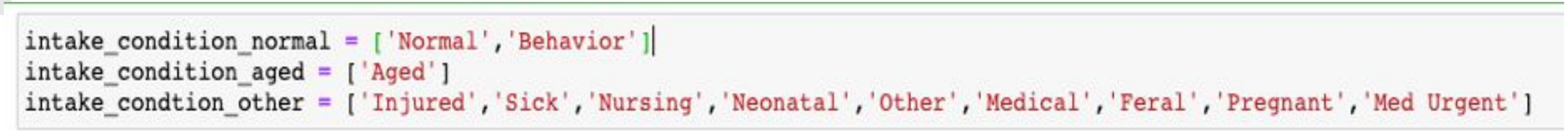


```
report = classification_report(y_test, y_pred)
print(report)
```

```
              precision    recall  f1-score   support

           0       0.70      0.89      0.78      2777
           1       0.84      0.58      0.69      2600

    accuracy                           0.74      5377
   macro avg       0.77      0.74      0.74      5377
weighted avg       0.76      0.74      0.74      5377
```

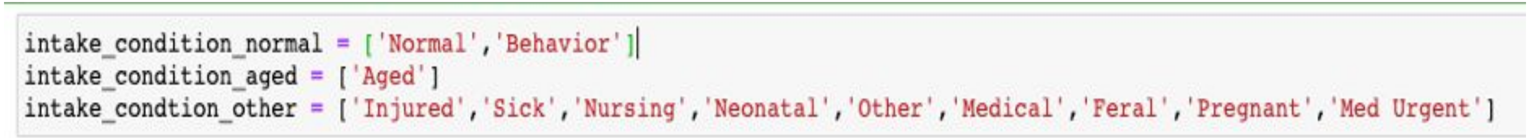


2. intake_condition is categorized into three main categories - Normal , Aged & Other - and then they are hot encoded and merged into the main dataframe df_dog_ML



```
intake_condition_normal = ['Normal','Behavior']
intake_condition_aged = ['Aged']
intake_condtion_other = ['Injured','Sick','Nursing','Neonatal','Other','Medical','Feral','Pregnant','Med Urgent']
```

3. outcome_type is categorized into two main categories - Success & Failure - and then they are hot encoded and merged into the main dataframe df_dog_ML.



```
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intake_condition_aged = ['Aged']
intake_condtion_other = ['Injured','Sick','Nursing','Neonatal','Other','Medical','Feral','Pregnant','Med Urgent']
```

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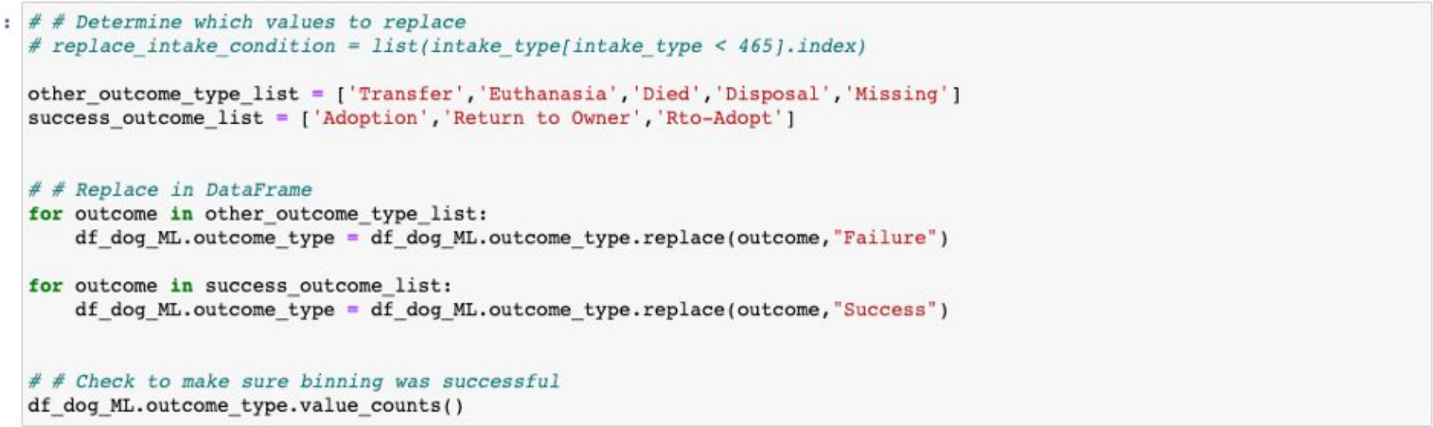
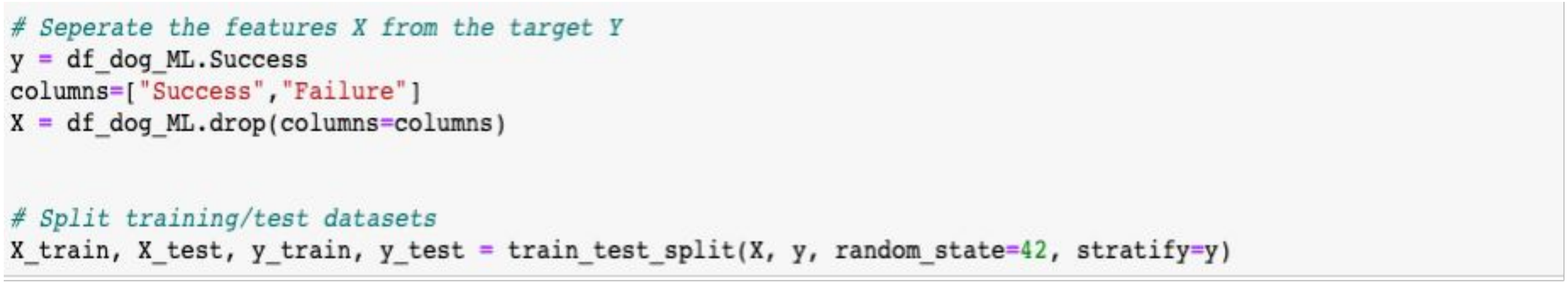


```
: # # Determine which values to replace
  # replace_intake_condition = list(intake_type[intake_type < 465].index)

  other_outcome_type_list = ['Transfer','Euthanasia','Died','Disposal','Missing']
  success_outcome_list = ['Adoption','Return to Owner','Rto-Adopt']


  # # Replace in DataFrame
  for outcome in other_outcome_type_list:
      df_dog_ML.outcome_type = df_dog_ML.outcome_type.replace(outcome,"Failure")

  for outcome in success_outcome_list:
      df_dog_ML.outcome_type = df_dog_ML.outcome_type.replace(outcome,"Success")


  # # Check to make sure binning was successful
  df_dog_ML.outcome_type.value_counts()
```

Then we used the function get_dummies on df_dog_ML["outcome_type"] and then merging into the dataframe df_dog_ML.

✓ Description of how data was split into training and testing sets

The data is split into X and y. Where below are the features -
X = The hot encoded values of the following features
‘age_upon_intake(days)’
’age_upon_outcome(days)’
’days_in_shelter’
’intake_condition’
‘color_intake’
‘breed_intake’
’intake_type’
Y = ‘outcome_type’ encoded for Success and Failure.



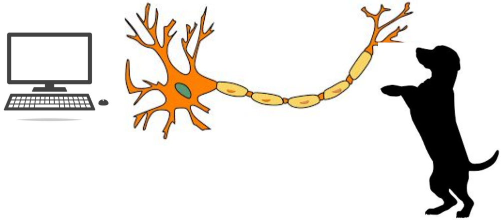
```
# Seperate the features X from the target Y
y = df_dog_ML.Success
columns=["Success","Failure"]
X = df_dog_ML.drop(columns=columns)


# Split training/test datasets
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42, stratify=y)
```

✓ Explanation of model choice, including limitations and benefits.

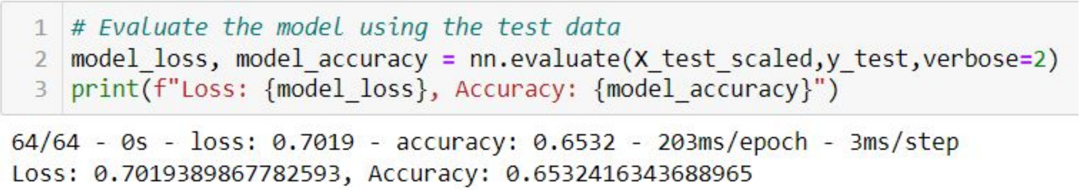
We used Logistic Regression and Random Forest Classification models to analyze the data.

Logistic Regression - is performed when we are expecting a Binary Outcome - Here we are running the ML model to determine if Dog / Cat will have success or Failure as outcome for given categories or features in consideration.
Random Forest Classification - This model produces good predictions, and is capable to handle large datasets efficiently. This model helps in producing higher level of accuracy. Below is the Confusion Matrix for Dogs and Cats.

Bonus Models



Neural Network Results

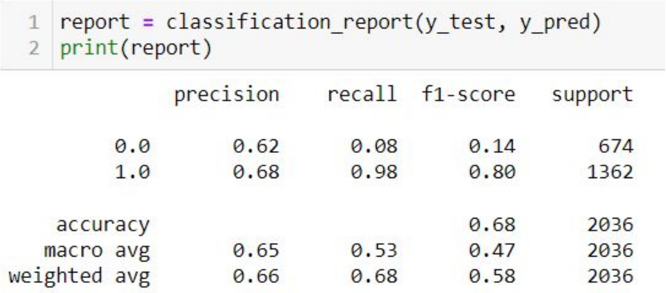


```
# Evaluate the model using the test data
model_loss, model_accuracy = nn.evaluate(X_test_scaled,y_test,verbose=2)
print(f"Loss: {model_loss}, Accuracy: {model_accuracy}")
```

```
64/64 - 0s - loss: 0.7019 - accuracy: 0.6532 - 203ms/epoch - 3ms/step
Loss: 0.7019389867782593, Accuracy: 0.6532416343688965
```

Logistic Regression Results

	Fail	Success
Fail	53	621
Success	33	1,329

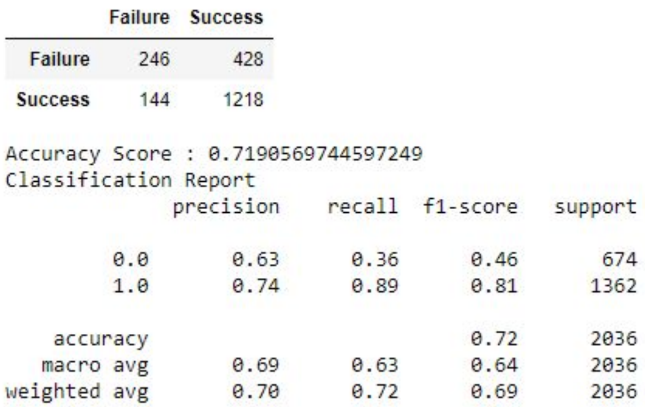


```
report = classification_report(y_test, y_pred)
print(report)
```

```
              precision    recall  f1-score   support

         0.0       0.62      0.08      0.14       674
         1.0       0.68      0.98      0.80      1362

    accuracy                           0.68      2036
   macro avg       0.65      0.53      0.47      2036
weighted avg       0.66      0.68      0.58      2036
```

Bonus Model Pt. 2

Random Forest Results



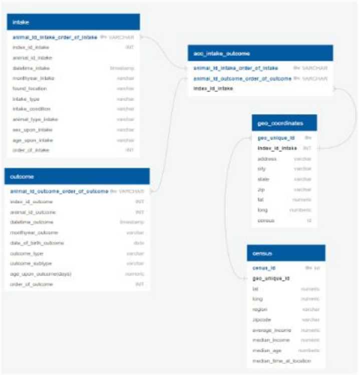
	Failure	Success
Failure	246	428
Success	144	1218

```
Accuracy Score : 0.7190569744597249
Classification Report
              precision    recall  f1-score   support

         0.0       0.63      0.36      0.46       674
         1.0       0.74      0.89      0.81      1362

    accuracy                           0.72      2036
   macro avg       0.69      0.63      0.64      2036
weighted avg       0.70      0.72      0.69      2036
```

SVM Results

Data Analysis

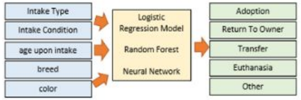
Data Sources:
Austin Animal Center Intake Data
Austin Animal Center Outcome Data
Texas A&M GeoServices
US Cenus Bureau



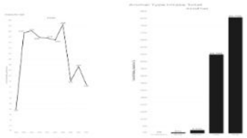
PostgreSQL13
Austin Animal Center Intake Data
Austin Animal Center Outcome Data
Texas A&M GeoServices Lat and Long
US Cenus Bureau

Output Files
acc_intake_outcome.csv
acc_intake_available

Jupyter Notebook
Apply analysis and
Filter for ML

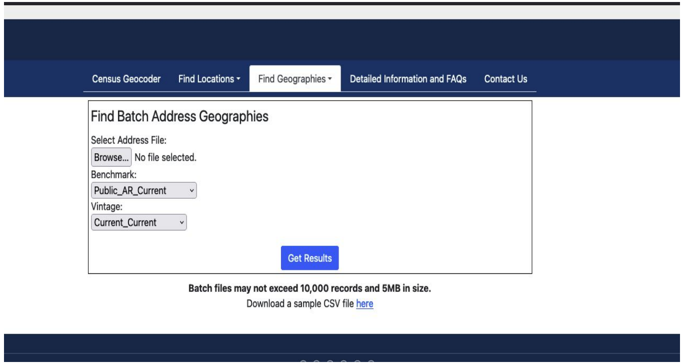


Machine Learning
Logistic Regression
Random Forest
Neural Networks



Tableua
Data Visualization and Story Telling

Geocoding and Demographics Data



Find Batch Address Geographies

Select Address File:

Browse... No file selected.

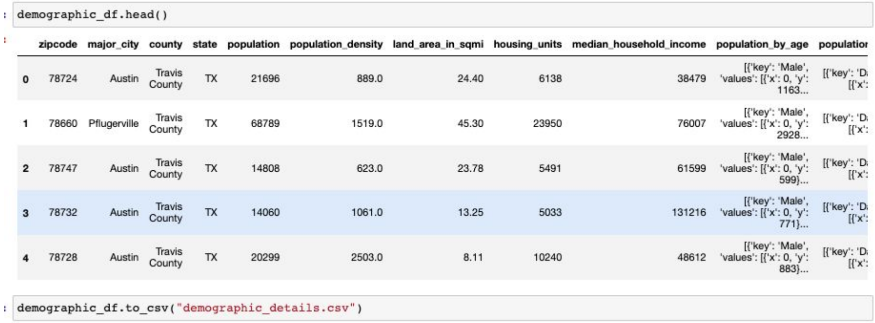
Benchmark: Public_AR_Current

Vintage: Current_Current

Batch files may not exceed 10,000 records and 5MB in size.

Download a sample CSV file here

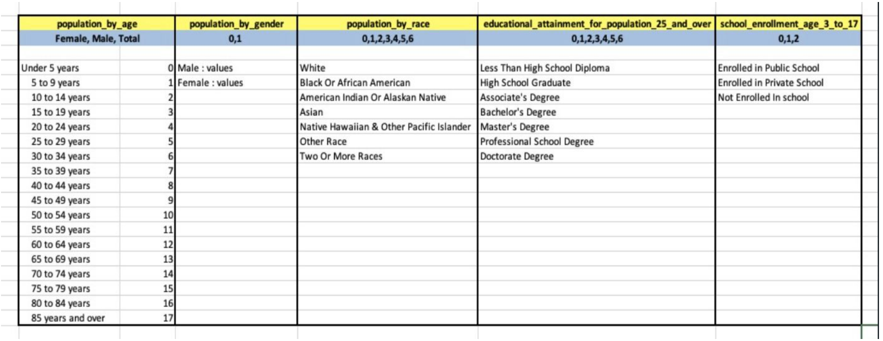
https://geocoding.geo.census.gov/geocoder/geographies/addressbatch?form



```
demographic_df.head()
```

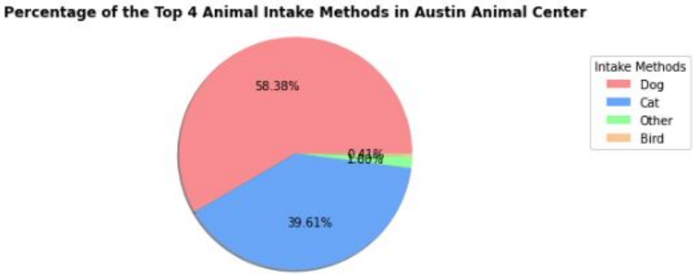
	zipcode	major_city	county	state	population	population_density	land_area_in_sqmi	housing_units	median_household_income	population_by_age	populatior
0	78724	Austin	Travis County	TX	21696	889.0	24.40	6138	38479	[{'key': 'Male', 'values': [{'x': 0, 'y': 1163...	[{'key': 'D [{'x':
1	78660	Pflugerville	Travis County	TX	68789	1519.0	45.30	23950	76007	[{'key': 'Male', 'values': [{'x': 0, 'y': 2928...	[{'key': 'D [{'x':
2	78747	Austin	Travis County	TX	14808	623.0	23.78	5491	61599	[{'key': 'Male', 'values': [{'x': 0, 'y': 599}...	[{'key': 'D [{'x':
3	78732	Austin	Travis County	TX	14060	1061.0	13.25	5033	131216	[{'key': 'Male', 'values': [{'x': 0, 'y': 771}...	[{'key': 'D [{'x':
4	78728	Austin	Travis County	TX	20299	2503.0	8.11	10240	48612	[{'key': 'Male', 'values': [{'x': 0, 'y': 883}...	[{'key': 'D [{'x':

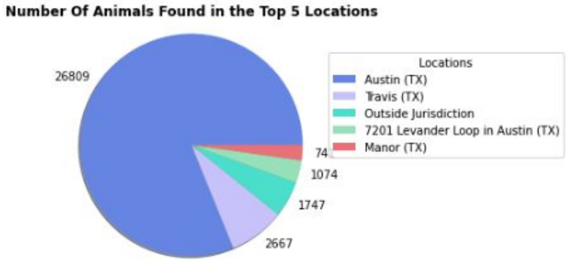
```
demographic_df.to_csv("demographic_details.csv")
```

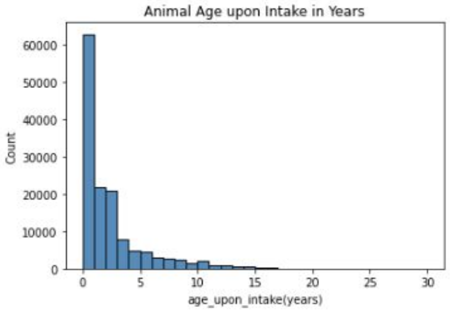


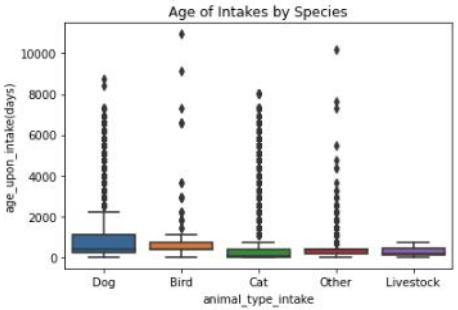
population_by_age		population_by_gender	population_by_race	educational_attainment_for_population_25_and_over	school_enrollment_age_3_to_17
Female, Male, Total		0,1	0,1,2,3,4,5,6	0,1,2,3,4,5,6	0,1,2
Under 5 years	0	Male : values	White	Less Than High School Diploma	Enrolled in Public School
5 to 9 years	1	Female : values	Black Or African American	High School Graduate	Enrolled in Private School
10 to 14 years	2		American Indian Or Alaskan Native	Associate's Degree	Not Enrolled In school
15 to 19 years	3		Asian	Bachelor's Degree	
20 to 24 years	4		Native Hawaiian & Other Pacific Islander	Master's Degree	
25 to 29 years	5		Other Race	Professional School Degree	
30 to 34 years	6		Two Or More Races	Doctorate Degree	
35 to 39 years	7				
40 to 44 years	8				
45 to 49 years	9				
50 to 54 years	10				
55 to 59 years	11				
60 to 64 years	12				
65 to 69 years	13				
70 to 74 years	14				
75 to 79 years	15				
80 to 84 years	16				
85 years and over	17				

Exploratory Data Analysis

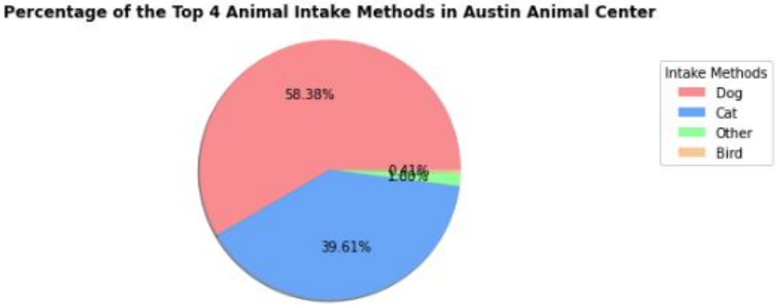

Percentage of the Top 4 Animal Intake Methods in Austin Animal Center

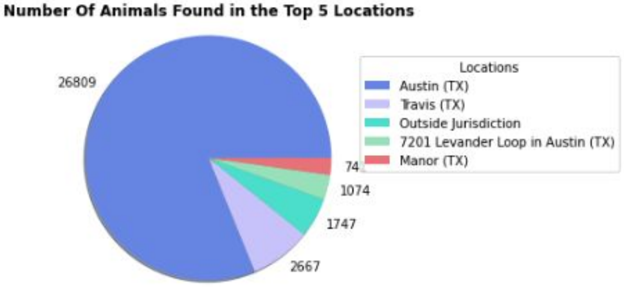

Number Of Animals Found in the Top 5 Locations

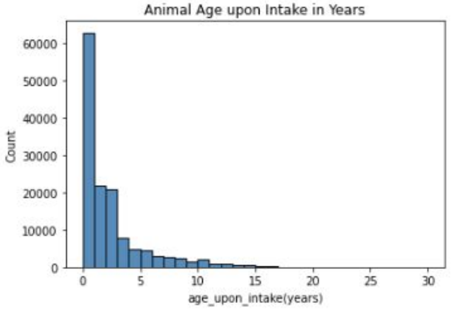

Animal Age upon Intake in Years

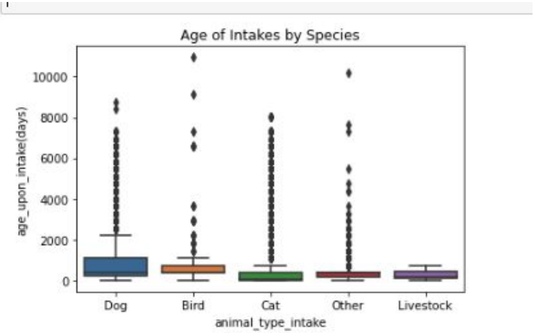

Age of Intakes by Species

Exploratory Data Analysis for Intake data

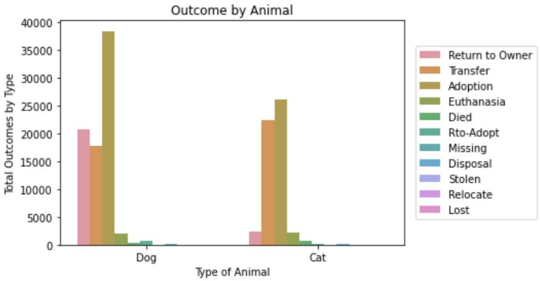


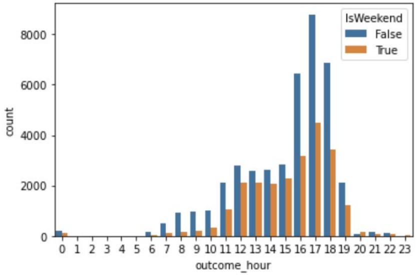




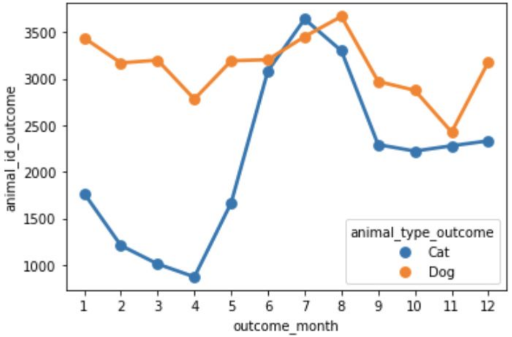


Exploratory Data Analysis for Outcome data





```
<AxesSubplot:xlabel='outcome_month', ylabel='animal_id_outco
```

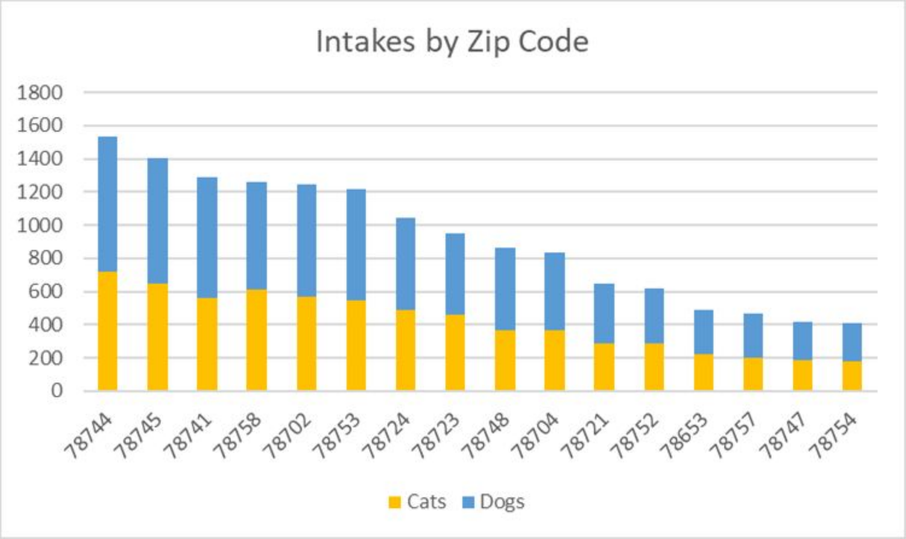


Data Exploration:

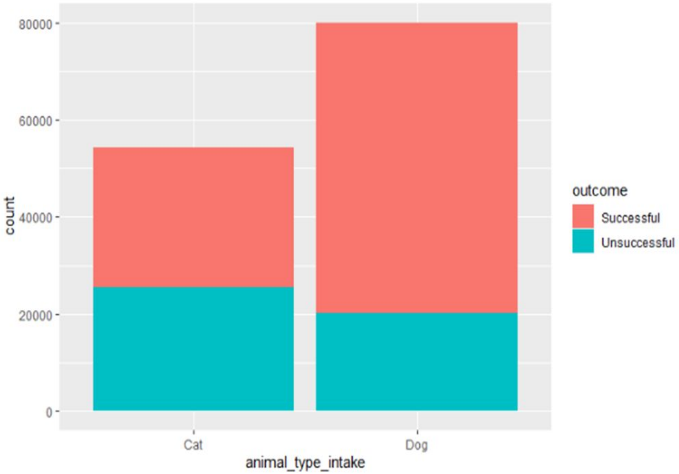
Where are the animals coming from?

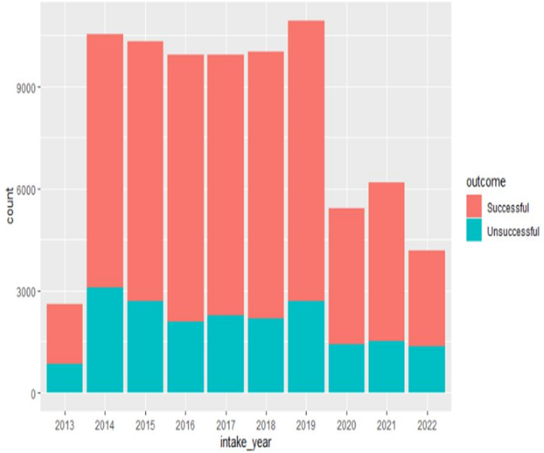
We will use a layered map in our dashboard to easily show common areas for strays.

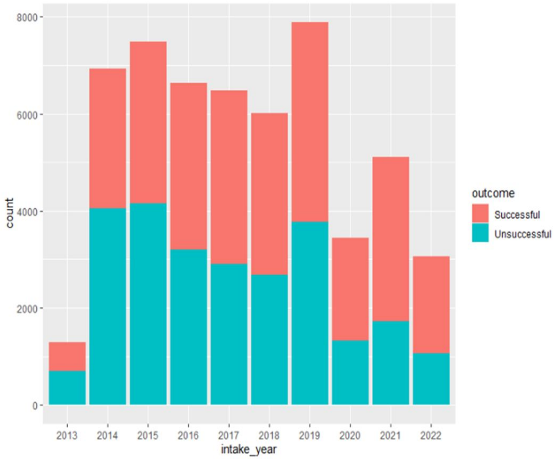
What is the proportion of animals that are brought to the AAC?



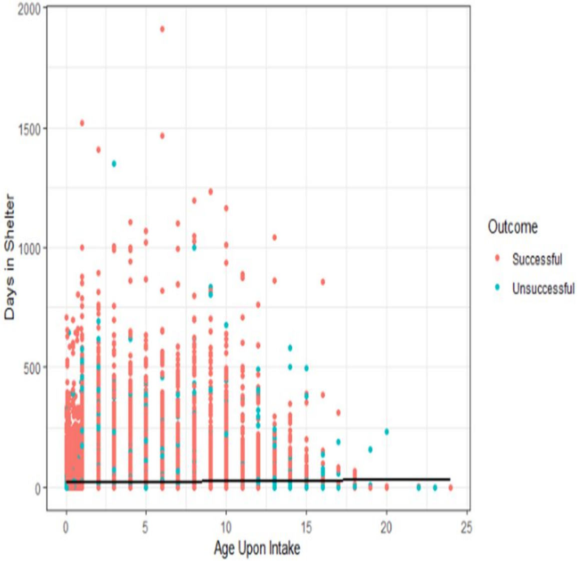
Overview of Outcomes (Sharon could we get these graphs in the without the legend? We just need one legend for all the graphs… this would be a great one to have interactive to show all outcomes (we do need to define how successful was defined… did you include RTO and adopted? Vs unsuccessful, although we also changed the meaning of unsuccessful to include animals in the shelter but that's ok)

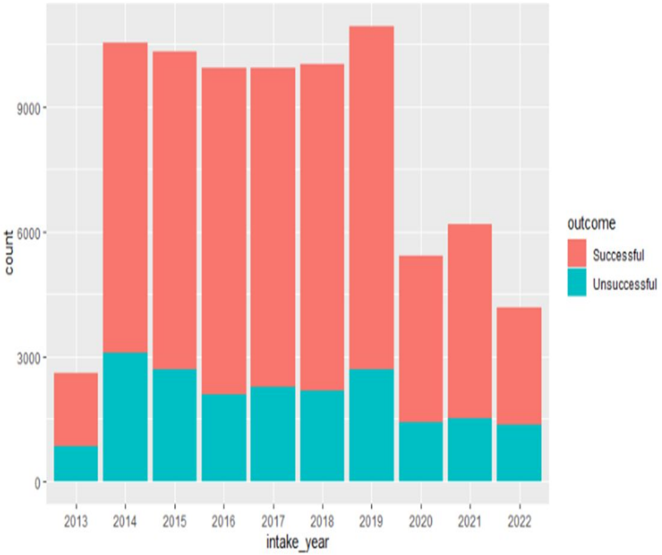




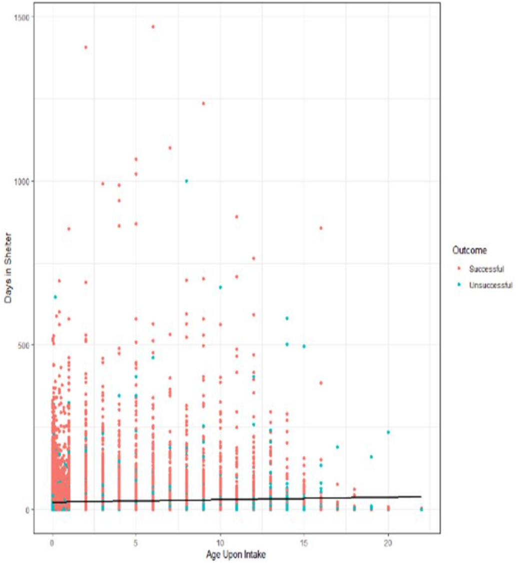


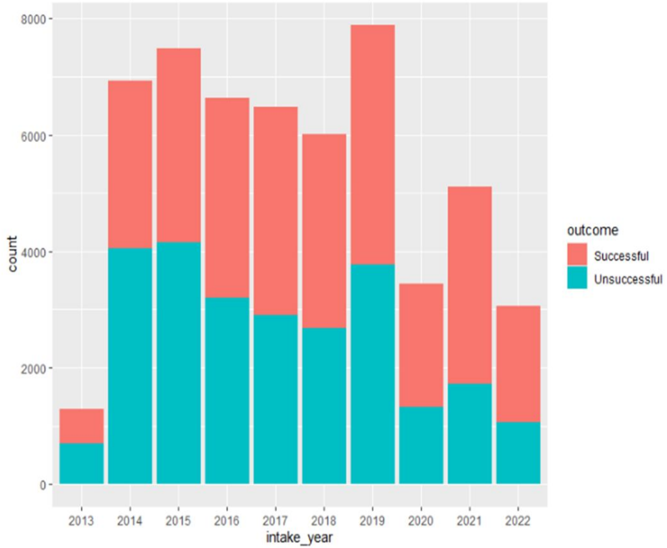
Dogs Categorized As Successful/Unsuccessful Outcome





Cats Categorized As Successful/Unsuccessful Outcome





Cats vs Dogs

Pie chart of outcomes for cats and dogs, chart showing most common breeds of dogs on intake, chart showing most common cat on intake

By the Numbers

Average time in shelter, average age of dogs on intake/outcome, average age of cats on intake/outcome.

Perhaps box and whisker plot on average time in shelter and simple chart of the ages?

A heat map that shows most popular day of the week to adopt?

Demographics on Intake Areas

Stacked bar chart based on median income and population density? Line graph on intakes vs income? Income vs population? I don’t think there is a linear relationship but perhaps? Just trying to vary up the types of graphs from bar chart.

Conclusion/Proposals

1). Drawing conclusions from our questions we solve with our data analysis/storytelling.

2). Propose ideas on how AAC could improve adoptability by targeting animals that are most adoptable to get them out of the shelter faster.

3). Propose new adoption programs that can improve adoption rates of older animals, lower cost upfront, extra supplies, and more.

4). Show pers how many pets are available in a local shelter in Austin.

The Nuts and Bolts of our Analysis

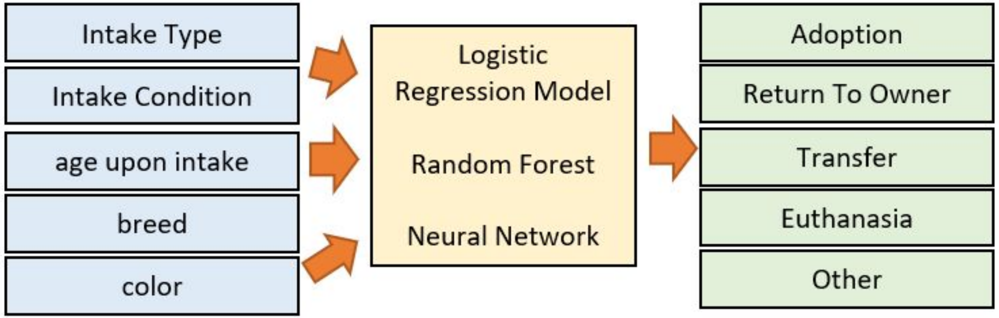
Technologies
GitHub
Tableau
Jupyter Notebook

Languages
Python
R
SQL

Tools
Google Slides

Workflow of Project: Machine Learning Model

The following is a provisional machine learning model which was used during the planning



Intake Type

Intake Condition

age upon intake

breed

color

Logistic Regression Model

Random Forest

Neural Network

Adoption

Return To Owner

Transfer

Euthanasia

Other